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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,732	07/12/2006	Toshio Hasegawa	293375US26PCT	6041

22850 7590 11/27/2009  
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.  
1940 DUKE STREET  
ALEXANDRIA, VA 22314

EXAMINER
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NGUYEN, KHIEM D

ART UNIT	PAPER NUMBER
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2823

NOTIFICATION DATE	DELIVERY MODE
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11/27/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com  
oblonpat@oblon.com  
jgardner@oblon.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/585,732	<b>Applicant(s)</b> HASEGAWA, TOSHIO	
	<b>Examiner</b> KHIEM D. NGUYEN	<b>Art Unit</b> 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 August 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 41-46 is/are pending in the application.
- 4a) Of the above claim(s) 41-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>06/11/2009</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Remarks***

1. The Amendment filed on August 07<sup>th</sup>, 2009 is acknowledged. Claims 1, 6, 7, and 13 have been amended, claims 17, 18, 21, 24-27, 30, 33 and 35 have been cancelled, and claims 41-46 are newly added and are withdrawn. Accordingly, claims 1-16 and 41-46 are pending in the present application in which claims 41-46 have been withdrawn from further consideration, claims 1 and 7 being independent form.
2. The newly submitted IDS filed on June 11<sup>th</sup>, 2009 has been considered, please find enclosed the acknowledged copy of the 1449-form.

### ***New Grounds of Rejection***

#### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamasaki et al. (U.S. Patent 7,482,283).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it

Art Unit: 2823

constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

In re claim 1, **Yamasaki et al.** disclose a film formation method for forming a metal nitride film having a predetermined thickness on a target substrate within a process container configured to be selectively supplied with a metal compound gas and a nitrogen-containing reducing gas, the film formation method being preset to repeat a cycle a plurality of times while heating the target substrate at a film formation temperature, the cycle comprising:

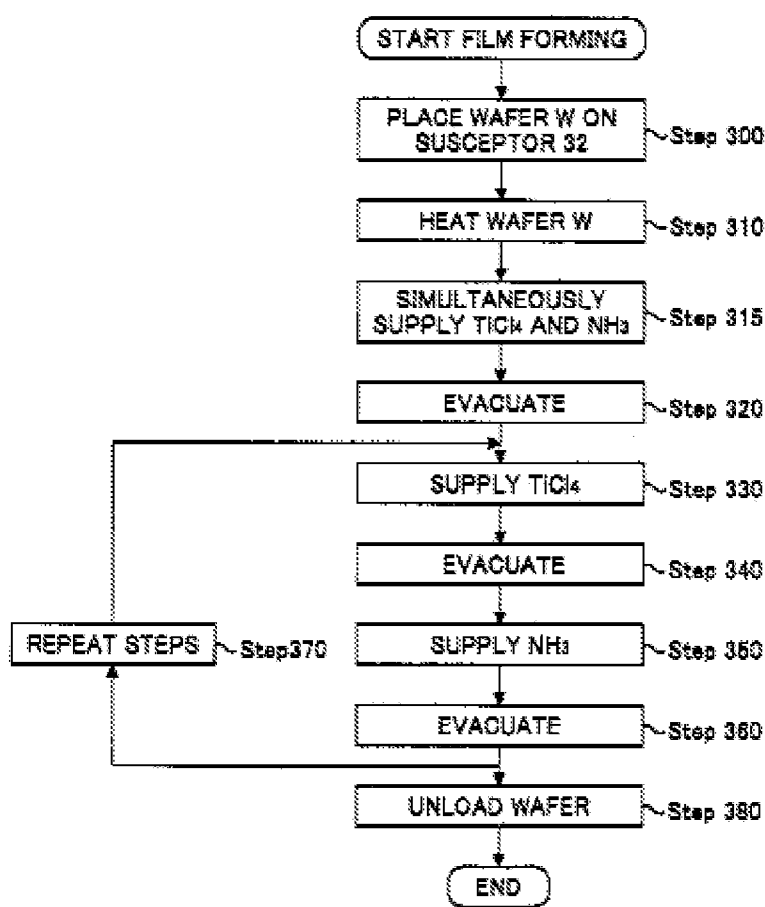
a first step (**Step 315**) of supplying the metal compound gas ( $\text{TiCl}_4$ ) and the nitrogen-containing reducing gas  $\text{NH}_3$  into the process container, thereby forming a film of a metal nitride by CVD (see col. 8, lines 3-9 and FIG. 9);

then, a first purge step (**Step 320**) of supplying a purge gas into the process container without supplying the metal compound gas and the nitrogen-containing reducing gas into the process container, thereby purging the process container (see col. 8, lines 10-18 and FIG. 9);

then, a second step (**Step 350**) of supplying the nitrogen-containing reducing gas into the process container without supplying the metal compound gas into the process container (see col. 8, lines 19-22 and FIG. 9); and

then, a second purge step (**Step 360**) of supplying a purge gas into the process container without supplying the metal compound gas and the nitrogen-containing reducing gas into the process container, thereby purging the process container (see col. 8, lines 23-31 and FIG. 9),

**FIG.9**



wherein the film formation temperature is set to be less than 450°C (see col. 7, lines 62-64), the process container is set to have therein a total pressure of more than 100 Pa in the first and second steps (see col. 7, lines 65-67), and

Art Unit: 2823

the nitrogen-containing reducing gas is set to have a partial pressure of 30 Pa or less within the process container in the first step (see col. 8, lines 3-11).

In re claim 2, as applied to claim 1 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein a film thickness obtained by the cycle performed once is set to be 0.50 nm or less (see col. 5, line 67).

In re claim 3, as applied to claim 1 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein, in the first step, the nitrogen-containing reducing gas is set to have a partial pressure of 20 Pa or less within the process container (see col. 8, lines 10-11).

In re claim 4, as applied to claim 3 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein a film thickness obtained by the cycle performed once is set to be 2.0 nm or less (see col. 8, lines 3-9).

In re claim 5, as applied to claim 1 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein, in the first step, the nitrogen-containing reducing gas is set to have a partial pressure of 15 Pa or less within the process container (see col. 8, lines 3-11).

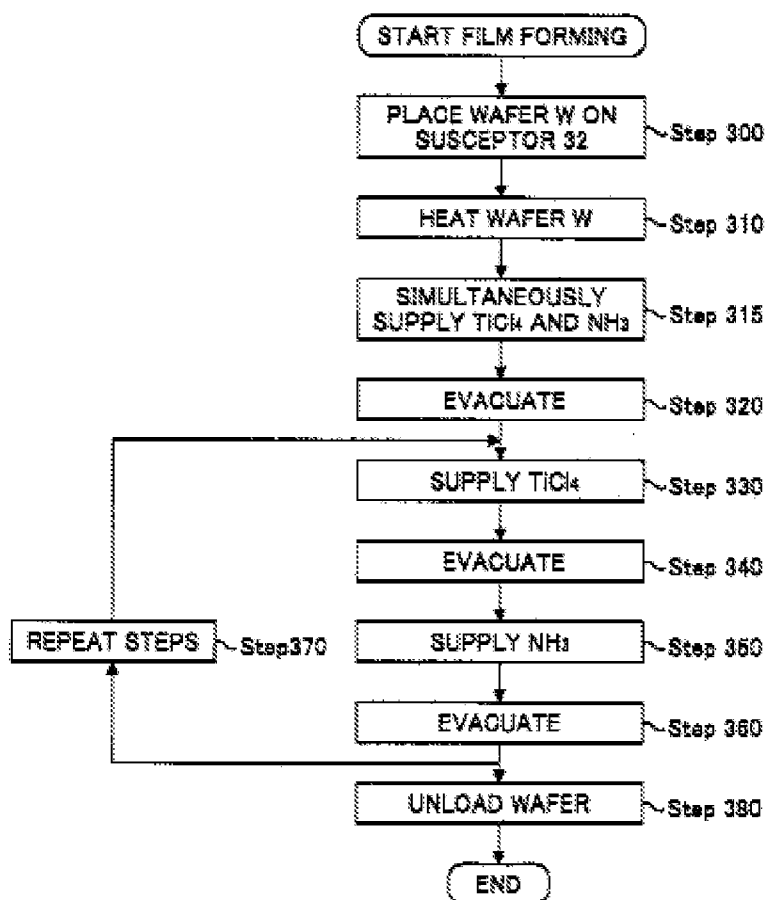
In re claim 6, as applied to claim 1 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein the film formation temperature is set to be 400°C or less (see col. 6, lines 3-13).

In re claim 7, **Yamasaki et al.** disclose a film formation method for forming a TiN film having a predetermined thickness on a target substrate within a process container configured to be selectively supplied with a Ti compound gas

Art Unit: 2823

and a nitrogen-containing reducing gas, the film formation method being preset to repeat a cycle a plurality of times while heating the target substrate at a film formation temperature, the cycle comprising:

a first step (**Step 315**) of supplying the Ti compound gas ( $\text{TiCl}_4$ ) and the nitrogen-containing reducing gas ( $\text{NH}_3$ ) into the process container, thereby forming a film of TiN by CVD (see col. 8, lines 3-9 and FIG. 9);

**FIG.9**

then, a first purge step (**Step 320**) of supplying a purge gas into the process container without supplying the Ti compound gas and the nitrogen-

Art Unit: 2823

containing reducing gas into the process container, thereby purging the process container (see col. 8, lines 10-18 and FIG. 9);

then, a second step (**Step 350**) of supplying the nitrogen-containing reducing gas into the process container without supplying the Ti compound gas into the process container (see col. 8, lines 19-22 and FIG. 9); and

then, a second purge step (**Step 360**) of supplying a purge gas into the process container without supplying the Ti compound gas and the nitrogen-containing reducing gas into the process container, thereby purging the process container (see col. 8, lines 23-31 and FIG. 9),

wherein the film formation temperature is set to be less than 450°C (see col. 7, lines 62-64), the process container is set to have therein a total pressure of more than 100 Pa in the first and second steps (see col. 7, lines 65-67), and the nitrogen-containing reducing gas is set to have a partial pressure of 30 Pa or less within the process container in the first step (see col. 8, lines 3-9).

In re claim 8, as applied to claim 7 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein the Ti compound gas is  $\text{TiCl}_4$  and the nitrogen-containing reducing gas is  $\text{NH}_3$  (see col. 8, lines 3-9).

In re claim 9, as applied to claim 7 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein a film thickness obtained by the cycle performed once is set to be 0.50 nm or less (see col. 5, line 67).

In re claim 10, as applied to claim 7 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein, in the first step, the nitrogen-



Art Unit: 2823

containing reducing gas is set to have a partial pressure of 20 Pa or less within the process container (see col. 8, lines 3-11).

In re claim 11, as applied to claim 10 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein a film thickness obtained by the cycle performed once is set to be 2.0 nm or less (see col. 8, lines 3-9).

In re claim 12, as applied to claim 7 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein, in the first step, the nitrogen-containing reducing gas is set to have a partial pressure of 15 Pa or less within the process container (see col. 8, lines 3-11).

In re claim 13, as applied to claim 7 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein the film formation temperature is set to be 400°C or less (see col. 6, lines 3-13).

In re claim 14, as applied to claim 7 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein in the first step, the nitrogen-containing reducing gas is set at a flow rate of 20 mL/min or more (see col. 8, lines 3-9).

In re claim 15, as applied to claim 7 above, **Yamasaki et al.** disclose all claimed limitations including the limitation wherein, in the first step, the Ti compound gas is set to have a partial pressure of more than 10 Pa and not more than 50 Pa (see col. 8, lines 3-9).

In re claim 16, as applied to claim 1 above, Yamasaki et al. disclose all claimed limitations including the limitation wherein the TiN film is set to have a resistivity of 800  $\mu\Omega$ -cm or less (see col. 7, lines 1-13).

***Response to Applicant's Amendment and Arguments***

5. Applicants' arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendment filed on August 07<sup>th</sup>, 2009.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Correspondence***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHIEM D. NGUYEN whose telephone number is (571)272-1865. The examiner can normally be reached on Monday-Friday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Khiem D. Nguyen/  
Primary Examiner, Art Unit 2823  
November 21<sup>st</sup>, 2009